

AMENDMENTS

In the Claims:

1. (Currently Amended) A semiconductor laser device comprising:
 - a first conductivity-type semiconductor substrate;
 - a first conductivity-type lower clad layer deposited on the first conductivity-type semiconductor substrate;
 - a lower guide layer deposited on the first conductivity-type lower clad layer;
 - a quantum well active layer deposited ~~directly on the first conductivity-type lower clad~~ lower guide layer;
 - an upper guide layer deposited on the quantum well active layer; and
 - a second conductivity-type upper clad layer deposited ~~directly on the quantum well active~~ upper guide layer, ~~and~~
 - ~~a guide layer made of an AlGaAs based material;~~
 - wherein the upper guide layer and the lower guide layer are made of an AlGaAs based material;

wherein the quantum well active layer comprises at least two barrier layers and at least one well layer, and the barrier layers and the well layers are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers, and

wherein the quantum well active layer is made of a non-Al based material and is doped with a second conductivity type of impurity.
2. (Withdrawn and Currently Amended) A semiconductor laser device having an oscillation wavelength larger than 760 nm and smaller than 800 nm, the semiconductor laser device comprising:
 - a first conductivity-type GaAs substrate;

a quantum well active layer deposited ~~directly~~ on the first conductivity-type GaAs substrate;
a second conductivity-type upper clad layer deposited ~~directly~~ on the quantum well active layer, and

a guide layer made of an AlGaAs-based material,

wherein the quantum well active layer comprises at least two barrier layers and at least one well layer which are made of an InGaAsP based material, and the barrier layers and the well layers are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers, and

wherein the quantum well active layer is doped with Zn as a second conductivity type of impurity.

3. (Withdrawn) A semiconductor laser device, comprising:

a first conductivity-type GaAs substrate;

a quantum well active layer deposited on the first conductivity-type GaAs substrate;

a second conductivity-type upper clad layer deposited on the quantum well active layer, and

a guide layer made of an AlGaAs-based material,

wherein the quantum well active layer comprises at least two barrier layers and at least one well layer which are made of an InGaAsP based material, and the barrier layers and the well layers are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers,

wherein the quantum well active layer is doped with Zn as a second conductivity type of impurity, and

wherein a concentration of Zn doped in the quantum well active layer is $2 \times 10^{17} \text{ cm}^{-3}$ or less.

4. (Withdrawn and Currently Amended) A semiconductor laser device, comprising:

a first conductivity-type semiconductor substrate;
a first conductivity-type lower clad layer deposited on the first conductivity-type semiconductor substrate;
a first guide layer made of an AlGaAs-based material deposited on the first conductivity-type lower clad layer;
a quantum well active layer deposited ~~directly~~ on the first guide layer;
a second guide layer made of an AlGaAs-based material deposited ~~directly~~ on the quantum well active layer; and
a second conductivity-type upper clad layer deposited on the second guide layer,
wherein the quantum well active layer comprises at least two barrier layers and at least one well layer, and the barrier layers and the well layers are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers, and
wherein the quantum well active layer is made of a non-Al based material and is doped with a second conductivity type of impurity.

5. (Withdrawn) The semiconductor laser device as defined in Claim 4, wherein a mixed crystal ratio of Al in the AlGaAs-based material that constitutes the guide layers is larger than 0.2.

6. (Withdrawn) The semiconductor laser device as defined in Claim 2, wherein the well layer has a compressive strain.

7. (Withdrawn) The semiconductor laser device as defined in Claim 6, wherein quantity of the compressive strain is 3.5% or less.

8. (Withdrawn) The semiconductor laser device as defined in Claim 6, wherein the barrier layer has a tensile strain.

9. (Withdrawn) The semiconductor laser device as defined in Claim 8, wherein quantity of the tensile strain is 3.5% or less.

10. (Original) An optical disk reproducing and recording unit comprising the semiconductor laser device as defined in Claim 1.

11. (Currently Amended) A semiconductor laser device comprising:
a first conductivity-type semiconductor substrate;
a first conductivity-type lower clad layer deposited on the first conductivity-type semiconductor substrate;
a lower guide layer deposited on the first conductivity-type lower clad layer;
a quantum well active layer deposited ~~directly~~ on the ~~first conductivity-type lower clad~~
lower guide layer;
an upper guide layer deposited on the quantum well active layer; and
a second conductivity-type upper clad layer deposited ~~directly~~ on the ~~quantum well active~~
upper guide layer, and
a guide layer made of an AlGaAs-based material,
wherein the upper guide layer and the lower guide layer are made of an AlGaAs based material,

wherein the quantum well active layer comprises at least two barrier layers and at least one well layer, and the barrier layers and the well layers are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers, and

wherein the quantum well active layer is made of a non-Al based material and is doped with a first conductivity type of impurity.

12. (Withdrawn and Currently Amended) A semiconductor laser device having an oscillation wavelength larger than 760 nm and smaller than 800 nm, the semiconductor laser device comprising:

a first conductivity-type GaAs substrate;

a first conductivity-type lower clad layer deposited ~~directly~~ on the first conductivity-type GaAs substrate;

a quantum well active layer deposited ~~directly~~ on the first conductivity-type lower clad layer;

a second conductivity-type upper clad layer deposited ~~directly~~ on the quantum well active layer, and

a guide layer made of an AlGaAs-based material,

wherein the quantum well active layer comprises at least two barrier layers and at least one well layer which are made of an InGaAsP based material, and the barrier layers and the well layers are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers, and

wherein the quantum well active layer is doped with Si as a first conductivity type of impurity.

13. (Withdrawn) The semiconductor laser device as defined in Claim 12, wherein a concentration of Si doped in the quantum well 15 active layer is $2 \times 10^{17} \text{ cm}^{-3}$ or less.

14. (Withdrawn and Currently Amended) A semiconductor laser device, comprising:

a first conductivity-type semiconductor substrate;
 a first conductivity-type lower clad layer deposited on the first conductivity-type semiconductor substrate;
 a first guide layer made of an AlGaAs-based material deposited on the first conductivity-type lower clad layer
 a quantum well active layer directly deposited ~~directly~~ on the first guide layer;
 a second guide layer made of an AlGaAs-based material deposited ~~directly~~ on the quantum well active layer; and
 a second conductivity-type upper clad layer ~~directly~~ deposited on the second guide layer,
 wherein the quantum well active layer comprises at least two barrier layers and at least one well layer, and the barrier layers and the well layers are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers, and
 wherein the quantum well active layer is made of a non-Al based material and is doped with a first conductivity type of impurity.

15. (Withdrawn) The semiconductor laser device as defined in Claim 14, wherein a mixed crystal ratio of Al in the AlGaAs-based material that constitutes the guide layers is larger than 0.2.

16. (Withdrawn) The semiconductor laser device as defined in Claim 12, wherein the well layer has a compressive strain.

17. (Withdrawn) The semiconductor laser device as defined in Claim 16, wherein quantity of the compressive strain is 3.5% or less.

18. (Withdrawn) The semiconductor laser device as defined in Claim 16, wherein the barrier layer has a tensile strain.

19. (Withdrawn) The semiconductor laser device as defined in Claim 18, wherein quantity of the tensile strain is 3.5% or less.

20. (Original) An optical disk reproducing and recording unit comprising the semiconductor laser device as defined in Claim 11.

21. (Currently Amended) A manufacturing method of a semiconductor laser device, comprising:

depositing a first conductivity-type lower clad layer on a first conductivity-type semiconductor substrate;

depositing a lower guide layer on the first conductivity-type lower clad layer;

depositing a quantum well active layer ~~directly~~ on the ~~first conductivity-type lower clad~~ lower guide layer; and

depositing an upper guide layer on the quantum well active layer; and

depositing a second conductivity-type upper clad layer ~~directly~~ on the ~~quantum well active~~ upper guide layer,

wherein the quantum well active layer comprises at least two barrier layers and at least one well layer, and the barrier layers and the well layers are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers, and

wherein the quantum well active layer is made of a non-Al based material and is grown while being doped with a second conductivity type of impurity.

22. (Withdrawn and Currently Amended) A manufacturing method of a semiconductor laser device having an oscillation wavelength larger than 760 nm and smaller than 800 nm, the manufacturing method comprising:

depositing a first conductivity-type lower clad layer on a first conductivity-type GaAs substrate;

depositing a quantum well active layer ~~directly~~ on the first conductivity-type lower clad layer; and

depositing a second conductivity-type upper clad layer ~~directly~~ on the quantum well active layer,

wherein the quantum well active layer comprises at least two barrier layers and at least one well layer which are made of an InGaAsP based material, and the barrier layers and the well layers are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers, and

wherein the quantum well active layer is grown while being doped with Zn as a second conductivity type of impurity.

23. (Withdrawn) A manufacturing method of a semiconductor laser device having an oscillation wavelength larger than 760 nm and smaller than 800 nm, the manufacturing method comprising:

depositing a first conductivity-type lower clad layer on a first conductivity-type GaAs substrate;

depositing a quantum well active layer on the first conductivity-type lower clad layer; and

depositing a second conductivity-type upper clad layer on the quantum well active layer,

wherein the quantum well active layer comprises at least two barrier layers and at least one well layer which are made of an InGaAsP based material, and the barrier layers and the well layers

are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers,

wherein the quantum well active layer is grown while being doped with Zn as a second conductivity type of impurity, and

wherein Zn is so doped that a concentration thereof in the quantum well active layer is $2 \times 10^{17} \text{ cm}^{-3}$ or less.

24. (Currently Amended) A manufacturing method of a semiconductor laser device, comprising:

depositing a first conductivity-type lower clad layer on a first conductivity-type semiconductor substrate;

depositing a lower guide layer on the first conductivity-type lower clad layer;

depositing a quantum well active layer ~~directly~~ on the ~~first conductivity-type lower clad~~ lower guide layer; ~~and~~

depositing an upper guide layer on the quantum well active layer; and

depositing a second conductivity-type upper clad layer ~~directly~~ on the ~~quantum-well-active~~ upper guide layer,

wherein the quantum well active layer comprises at least two barrier layers and at least one well layer, and the barrier layers and the well layers are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers, and

wherein the quantum well active layer is made of a non-Al based material and is grown while being doped with a first conductivity type of impurity.

25. (Currently Amended) A manufacturing method of a semiconductor laser device having an oscillation wavelength larger than 760 nm and smaller than 800 nm, the manufacturing method comprising:

depositing a first conductivity-type lower clad layer on a first conductivity-type GaAs substrate;

depositing a lower guide layer made of an AlGaAs based material on the first conductivity-type lower clad layer;

depositing a quantum well active layer ~~directly~~ on the ~~first conductivity-type lower clad lower guide layer~~; and

depositing an upper guide layer made of an AlGaAs based material on the quantum well active layer; and

depositing a second conductivity-type upper clad layer ~~directly~~ on the ~~quantum well active upper guide layer~~,

wherein the quantum well active layer comprises at least two barrier layers and at least one well layer which are made of an InGaAsP based material, and the barrier layers and the well layers are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers, and

wherein the quantum well active layer is grown while being doped with Si as a first conductivity type of impurity.

26. (Previously Presented) The manufacturing method of the semiconductor laser device as defined in Claim 25, wherein Si is so doped that a concentration thereof in the quantum well active layer is $2 \times 10^{17} \text{ cm}^{-3}$ or less.

27. (New) A manufacturing method of a semiconductor laser device having an oscillation wavelength larger than 760 nm and smaller than 800 nm, the manufacturing method comprising:

depositing a first conductivity-type lower clad layer on a first conductivity-type GaAs substrate;

depositing a lower guide layer made of an AlGaAs based material on the first conductivity-type lower clad layer;

depositing a quantum well active layer on the lower guide layer;

depositing an upper guide layer made of an AlGaAs based material on the quantum well active layer; and

depositing a second conductivity-type upper clad layer on the upper guide layer,

wherein the quantum well active layer comprises at least two barrier layers and at least one well layer which are made of an InGaAsP based material and the barrier layers and the well layers are alternately stacked such that a top layer and a bottom layer of the quantum well active layer are barrier layers, and

wherein the quantum well active layer is grown while being doped with Zn as a second conductivity type of impurity.

28. (New) The manufacturing method of the semiconductor laser device as defined in claim 27, wherein Zn is so doped that a concentration thereof in the quantum well active layer is $2 \times 10^{17} \text{ cm}^{-3}$ or less.

29. (New) The manufacturing method of the semiconductor laser device as defined in claim 21, wherein, as the second conductivity type of impurity, Zn is so doped, that a concentration thereof in the quantum well active layer is $2 \times 10^{17} \text{ cm}^{-3}$ or less.

30. (New) The manufacturing method of the semiconductor laser device as defined in claim 24, wherein, as the first conductivity type of impurity, Si is so doped, that a concentration thereof the quantum well active layer is $2 \times 10^{17} \text{ cm}^{-3}$ or less.

31. (New) The semiconductor laser device as defined in claim 1, wherein the upper guide layer is doped with the second conductivity type of impurity.

32. (New) The semiconductor laser device as defined in claim 11, wherein the lower guide layer is doped with the first conductivity type of impurity.

33. (New) The semiconductor laser device as defined in claim 31, wherein Zn is used as the second conductivity type of impurity in the quantum well active layer and the upper guide layer.

34. (New) The semiconductor laser device as defined in claim 33, wherein a concentration of Zn is $2 \times 10^{17} \text{ cm}^{-3}$ or less.

35. (New) The semiconductor laser device as defined in claim 32, wherein Si is used as the first conductivity type of impurity in the quantum well active layer and the lower guide layer.

36. (New) The semiconductor laser device as defined in claim 35, wherein a concentration of Si is $2 \times 10^{17} \text{ cm}^{-3}$ or less.

37. (New) The semiconductor laser device as defined in claim 31, wherein a mixed crystal ratio of Al in AlGaAs-based material that constitutes the upper guide layer is a homogeneous value larger than 0.2.

38. (New) The semiconductor laser device as defined in claim 32, wherein a mixed crystal ratio of Al in AlGaAs-based material that constitutes the lower guide layer is a homogeneous value larger than 0.2.

39. (New) The manufacturing method of the semiconductor laser device as defined in claim 21, wherein the upper guide layer is grown while being doped with the second conductivity type of impurity.

40. (New) The manufacturing method of the semiconductor laser device as defined in claim 24, wherein the lower guide layer is grown while being doped with the first conductivity type of impurity.